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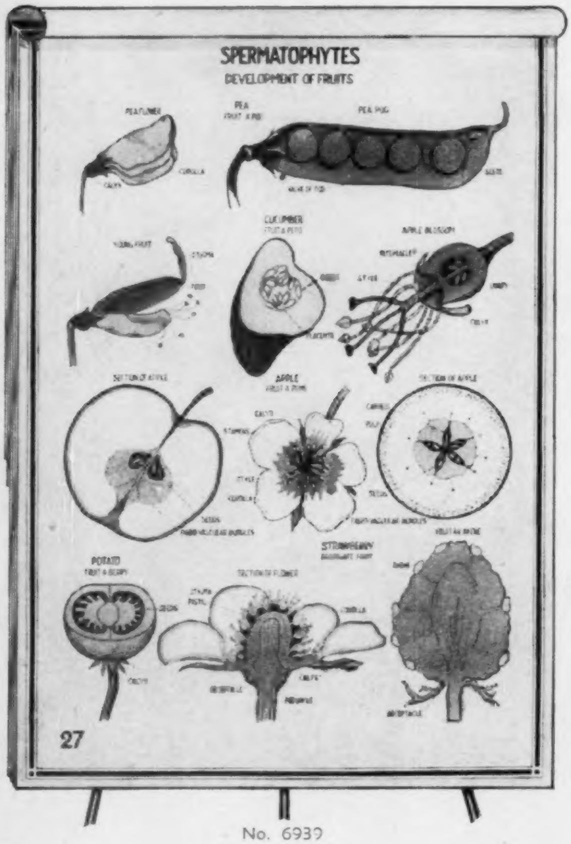

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"Dry As Chalk Dust"

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It all began when I stepped into the car with my sixteen-year old son at the wheel and on the other side of me, a pal of his. I picked up the latter's biology text-book. I asked the boy if he liked biology and he answered, "I don't understand it. I'm repeating it this term. I suppose I'll flunk it again."

Thumbing through the pages, I wasn't surprised that the boy's attention hadn't been held by this text, and that he had developed a defeatist attitude. It consisted mainly of difficult scientific terms with equally difficult explanations. There was little to fire the imagination of the average student and lead him into what can be the wondrous field of nature.

I said aloud, "I don't wonder that you didn't get through this course. It would take a trained mind considerable time to remember the material here. It's too bad you haven't a book that is more simply written. This book is really above high school level."

"That's what my teacher said," he replied.

Just then I happened to turn a page and noted the word, cretaceous (chalk), a hard word to remember in any one's vocabulary, let alone that of a high school student daily being crammed with many such technical terms.

The paragraph that I read was as dry as the chalk dust deposits made by what were once living animals who helped to build the White Cliffs of Dover. When I related in simple, everyday language of the foraminifera shells and how these tiny animals laid the foundations of islands and even new continents, how they built cities and pyramids, Walt seemed amazed that biology could reveal anything that interesting.

I don't doubt that his teacher had presented equally interesting facts, but the lad had apparently been sold on the idea, and the text helped, that biology was an exceedingly dry subject; that it was less boring to look out of the class-room window at nature in action—white clouds floating in a blue sky. Contrarily, in his text, he was confronted with names that he could hardly digest, or even pronounce.

This incident would indicate that the method of teaching biology in the high school is not one that will inspire a student to go out on his own and add to his knowledge of nature, either in book or field.

I have a selfish motive in wishing to see a more readable and easy to understand text. My son, Rickey, will be taking Biology next year. He, too, will have two strikes against him to start with if he has to plough through a purely technical book without any of the many concrete illustrations of nature's wonder world.

It is my sincere belief that once the student's imagination is spurred with the astonishing things that are happening and have happened in nature, then he will be ready to learn the "binomial system of nomenclature". It is safe to say that the distinguished botanist, Carl Linnaeus, who invented scientific classification, did not do so with the idea of pushing the younger generation away from nature. He would possibly be the first to urge that classification be given in small, digestible doses.

Admittedly, the word "cretaceous" is important in identifying the "Age of Chalk". And so is "foraminifera," the technical name of those microscopic animals that produce the fine, dry dust that was formerly used for writing on blackboards.

But one might venture to assume that Linnaeus would consider the knowledge of the animal itself more memorable to the beginning student of Biology. For example, any naturalist for that matter, would probably agree that it is infinitely more inspirational to know that tiny animals, living and dying through countless ages, made the thick beds of chalk upon which the town of Richmond, Virginia, was built.

Too, it is significant proof that although Mother Nature is great in great things, she is still more so in those which are minute; such as the "foraminifera" who built their little shells from lime which they obtained from the sea water. They still exist today, whereas the dinosaur has been chalked off on nature's great blackboard.

If such simple fascinating information continues to be shackled by a chain of dry, technical and uninspiring material appearing in many present biological text-books, then we should not be surprised at the growing Biological Illiteracy.

Advanced Nature Study, a practical course in outdoor education, will be given by the State Teachers College, Indiana, Pennsylvania, June 5–16, 1950.

Different in that it takes the student to an actual camp situation, this intensive three-credit, three-week course is designed to enable the teacher or prospective teacher to feel at home in the outdoor environment. The training will give teachers experiences in outdoor education procedures so that they will be able to take part in public school camping programs, use such procedures in their public school program, or serve as counselors in summer camps. The course may serve as an elective or it may contribute toward a major or minor in biological science.

The program of outdoor education being offered will include field trips to get acquainted with the plants and animals of the area. Star study, rock study, crafts, music, and physical education and recreation will have a definite part in the program. Music students, art students, physical education students will secure a strong natural history background necessary for outdoor work. Biology majors will secure art, music, and physical education experiences sufficient to participate in such activities in summer camps, but not to direct them.

Every effort will be made to place qualified students in summer camp positions if they wish to be placed following the close of the course. Cost of the course will be approximately $75.00 to $100.00.

Student Prediction of Examination Questions

CHARLES E. PACKARD
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Final examinations cause much discussion and no little concern among students generally. The cultivation of good study habits ought to begin with the earliest school years. Lack of such frequently accompanies test worries. Only too often parents and teachers alike fail to direct youth into proper disciplines for learning. Occasionally a student tells someone he has chosen to room in a private home because he wishes to concentrate where it is quieter than in dormitory or fraternity house.

How to encourage an advisee or a college group to begin the formulation of systematic, orderly preparation of assignments in language, history, science or any other course is a real problem for one who likes to see good minds do more than passing work. The teacher of biology can scarcely take several weeks of precious time in trying to orient and train classes in the techniques that have proved effective for himself in mastering facts and principles. He must throw out hints and suggestions as side-issues.

In college work there is little opportunity for old-fashioned drill. Yet for many people this is the proved way of making facts stick. Usage alone creates the groove that results in retention. But it must be the hearer, not the lecturer, who does the using. Phrases such as "transition from water to land" become meaningful only when they are put into expression by the individual himself. Advanced teaching begins properly with exposure. It should not end there. Whoever haunts ivied halls is expected to assimilate and store the knowledge stream which tumbles so turbulently onward from period to period. There's not much chance to impound it. He comes in contact with so much concrete information continuously bubbling forth from the fountain head that he does not distinguish clearly between what is important and what is not. Modern textbooks in science are increasingly encyclopedic as well as technical. If the book is to become a useful tool considerable attention must now be paid toward making it intelligible.

Occasionally it is well to do a little investigating. What a student thinks about this or that topic, procedure, or aim may be very revealing. Everything is so crystal clear to the instructor as he looks ahead, or back upon, familiar vistas already seen repeatedly. It may not prove so for the beginner.

One institution has provided "Review Days" for instructional benefit. The professor could use this time in formal summary, for answering questions, or in conference. Class attendance was not compulsory. It was expected that it be used constructively in preparation for the inevitable tests. As high as fifty per cent in biology came as usual. Of course, some asked "what they should study". In answer a topical outline has often been issued covering major points. Nearly always the kind of survey was held which exposed student ideas of important principles.

At one time on the last day of formal classes before the first semester finals all those in General Biology were asked to write and return, signed or unsigned, the special question of merit which it was felt would very likely be asked because worthy of remembering. It was hoped that a check would result on (a) how well the instructor had been followed in what had been emphasized; (b)

what the student himself considered personally most valuable (c) how class opinion might coincide with a set of questions already prepared (d) what the class as a whole considered it should review (e) how uniform group opinion might be with regard to the subject matter covered.

Forty-two replies were collected. Thirty-four signed. Why eight did not is anybody's guess but if they felt easier in not doing so it was ample justification. Material was generally good, well phrased, significant. Broadly general topics were few. Specific ones treated structure, function, reproduction and life cycles, classification, ecology, definitions,—a generous spread.

Possibly two thirds of the work had been introductory, then botanical. Several hour writtens had been given. From Christmas on Human Biology had been treated. The final third of the year was to be devoted to animal phyla exclusive of man. The frog served as the vertebrate laboratory type. Functional exercises were sprinkled over the basic morphological pattern.

Nearly all the questions, therefore, were on botany. They involved photosynthesis, moss and fern life cycles, comparison between algae and fungi, classification of the Thallophyta, comparison of a monocotyledon and dicotyledonous stem, sexual reproduction in plants, wheat rust cycle, especially applicable to plants. Some had to do with the framework of frog and man. A few were basic to all of biology.

The examination consisted of two parts; (a) appreciation and comprehension, general in nature, requiring careful thinking, perspective, summarization, and appraisal of values; (b) fact mastery and recall was composed of specific principles and information. Seven questions comprised the first part. The second had six. There were some alternatives for the three-hour period.

There was essentially no anticipation on appreciation and comprehension, an expected outcome because of its general nature. Approximating generalities were two which touched upon critical thinking and the purpose of a course in General Biology. Fifth on this test list was "What five broad, outstanding features, phenomena, or problems of plant biology do you feel warrant remembering and rather thorough understanding by the student of general biology? Why?" The following table shows that botanical principles were grasped.

Topic	Used by Different Members
Life Cycles	8
Photosynthesis	7
Osmosis	4
Respiration	3
Adaptation	3
Forest Habitat Interrelations	3
Metabolism	1
Sexual Reproduction	1

The seven questions of this portion of the examination were so constructed as to measure abilities other than straight memorization. They dealt with a criticism of the laboratory and experimental methods; the scope of Biology; protoplasmic components; cell types; individual exploration into Biology; the importance of plants.

Fact mastery and recall was very specific. There were a number of possible choices permitted. The osmotic process is the only idea in the above table which did not occur, directly or indirectly, in this part of the examination. Four had thought it would appear. Other topics which students expected but did not find when examined were:

Topic	Used by Different Members
Mono- and Dicotyledons	1
Plant Tissue Structure	1
Algae and Fungi-	

Comparison	2
Algae and Fungi-Classification	2

Ten of the forty-two enrolled, therefore, were disappointed in their prognosis.

Ideas incorporated by the instructor which no one predicted concerned corn grain and bean seed; fruit types; methods of cross pollination. A single question referred to that small segment of Human Biology which had been under discussion before the semester ended. This was centered around the skeleton. Six class members expected something of the sort would be included.

Questions were surprisingly well chosen and formulated as has been mentioned. A few were unacceptable for various reasons. A girl of good mentality, doing *B* work, called for the life cycles of molds and liverworts when it had been expressly stated that they would not be stressed. A male, premedical student asked "What is the function of the pelvic girdle?" Some time had been devoted to its stability, importance, strength as compared to the pectoral region, evolution and homology. Therefore the impression made on one individual to some extent was evinced by his query.

It is seen that the exercise did provide a check on instruction. One question per person was not as large a sample as would be required for complete establishment of the points raised. This was sensed by those who participated for in a number of instances two questions instead of one were returned. Faithful attention to discussion is indicated but by no means were results unanimous. Very clearly difference of opinion existed as to what would for certainty be required. It is concluded that more reliance should be placed by the students themselves on their own ability to diagnose important ideas and forecast their inclusion in tests of fact retention.

Demonstrating Circulation in a Frog

Colin described in this journal, Feb., 1940, V. 2, pp. 128–129, a technique for using goldfish anesthetized with chloretone for demonstrating circulation in the tail.

Another method involves stretching the web of a frog's foot over a slide, or a hole in a frog board, so that it can be viewed through the microscope. Usually this involved tying the frog down securely or clipping him to a board. If the animal struggles, which is common, a readjustment may have to be made. This latter problem is avoided if the frog is first anesthetized by injecting into the dorsal lymph sac 1 cc. of 10% urethane (ethyl carbamate) for every fifty grams of frog, or .02 cc. for each gram of frog. Tuberculin syringes graduated in 0.01 cc. are excellent for injection. An overdosage of 20% is recommended. The frog will usually lie quiescent, without being tied. The foot is stretched over a slide and held there with a string or by a rubber band. If the leg is stretched out too far or too suddenly the frog will withdraw it reflexly. If it is found necessary to tie the frog down it can be done in the anaesthetized frog with little effort or care. Anaesthesia will last at least an hour, and we have kept demonstrations set up for two hours when the frog was wrapped in wet cotton. After the demonstration the frog will recover, especially if washed several times in cool water, and may be used later for any other laboratory purpose.

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The National Blood Program of the American Red Cross*

RUTH A. DODGE
Recruitment and Educational Consultant Blood Program

The veil of mystery surrounding the subject of blood is, at length, being lifted through the efforts of the men of research as their discoveries are being made known. The uses of whole blood and its products are assuming greater proportions as they are being made available to all without cost for the blood or its products. Gladly it is given by those who are able to do so, and as thankfully, it is received by those who need it. Through the National Blood Program of the American Red Cross, with its thirty centers throughout the United States, blood is being collected, processed and distributed to physicians and hospitals in quantities, which it is hoped are sufficient to meet the local needs.

Over a period of time the average anticipated needs of a community can be estimated. The rate of childbirth with a proportionate number of unusual cases, major surgery, and the incidence of certain diseases such as anemia, eventually assume a median of fluctuation in usual situations.

Beyond this, however, there is the unpredictable danger of disasters, such as train wrecks, industrial explosions, fires, tornadoes, and traffic accidents. These often occur without warning in densely populated areas and in remote places. Emergencies of this kind are usually sizeable and are taking a deadly toll of lives. The distress is often so widespread and the immediate need so great that the only hope for many victims lies in the availability of medical aid. The value of blood and its functions within the body have long been known, but it is only within the last fifty years that man has been able to share this precious gift of life-sustaining fluid with others.

It was Landsteiner who in nineteen hundred discovered the blood groups, recognized their hereditary nature, and indicated the value of this knowledge in making transfusions possible. But it took nearly forty additional years to devise suitable methods of preserving whole blood and plasma, to make it of any practical value. Spurred on by World War II, great strides were made in blood research, and the first plasma was shipped to Britain in 1942. Many servicemen and women, as well as civilians, owe their lives to the availability of this substance at the time it was needed.

The men of research are still continuing their efforts, unceasingly, in order to solve the mysteries surrounding blood. During this past year, announcement has been made of a method devised to separate the red cells from the white cells, and from the platelets. This is still under study and is being carried on at a Boston Medical Center. By using fibrinogen with its clotting powers, the red cells are made to clump together and settle to the bottom because of greater density. In about an hour the major portion of the cells can be separated; thereby, lessening the time factor and preventing injury to the cells through centrifuging. Likewise, the white cells can be siphoned away and the platelets separated. Those suffering from certain burns, who do not need the red cells, can

* Paper presented at the Regional meeting of the NATIONAL ASSOCIATION OF BIOLOGY TEACHERS held in Detroit, Michigan, November 19, 1949.

be given serum albumin, a blood fraction; while those suffering from certain kinds of anemia, can be given a concentration of red cells without the inclusion of the white cells which might themselves be destructive.

Thus, a whole field of research is opening up new ways of making greater use of whole blood. Silicone coated tubing and bottles are also used since the non-wetting surface prevents damage to the cells and prolongs their lives. The picture of the blood program is unfolding before our very eyes, and the story of the use of blood is as dramatic as was the Pasteur treatment of rabies or vaccination for smallpox.

Children and young people are protected from the after effects of measles by gamma globulin, a derivative of blood. Surgery patients with brain injuries received benefits from *fibrin film* and *fibrin foam*. Those suffering from hemophilia get relief and have the assurance that the antihemophilic serum is available for emergencies.

Aside from the research which is being carried on in relation to the blood itself, there is now being assembled a large quantity of scientific data obtained from blood donors which should prove to be of great value to the health activities of the country. Based on the knowledge of geographic areas, age ranges and other pertinent factors, such information includes the incidence of diseases, the hemoglobin index of men and women, nutritional defects, and general health conditions. A close relationship exists between the health departments, the medical and hospital associations and the Red Cross National Blood Program; thus, making it possible through concentrated efforts to follow through on many otherwise hidden factors.

This is called a blood program because it is designed to be far reaching in its effect. The men of research find the facts, devise methods, perfect techniques, but much of this would remain in the realm of pure science were it not for some social agency to bring it before the public, to work out a practical method for its use, and to assist in establishing the aid needed to carry it out until such time as these who have benefited recognize its value, and are willing to assume the responsibility.

The men and women, including many of us here, who have voluntarily given their blood that others might live, have given more than the blood itself, even as that is so greatly needed. They have given of themselves in the spirit of humanity and have demonstrated that they are ready to meet a current health need, to assume a community responsibility for maintaining a blood program and to foster that attitude in the minds of the young people. For our youth it will be their heritage; upon our youth will rest the responsibility. Let us then continue to be donors when possible, to inspire the youth in our schools and to interpret to our fellow men the aims and purposes of the blood program.

This is an opportunity far greater than the machines of operating centers and distributing blood to hospitals. It involves telling the facts to all the people and bringing the benefits to all. Students are interested in taking trips to the centers, in knowing what preservatives are used, how blood is typed, how it is tested for serology, how the *Rh* factor is determined and how blood is distributed. They like to know how plasma is made and how the fractions are produced. They will be interested not only in the local Blood Centers but in the fractionation plants such as at Lansing, Michigan.

Some time ago, two planes crashed at the Washington National Airport about 2½ miles from where I was working. A call came for all available blood. The

supply was low—but in this fatal crash fifty-five person were killed, and only a small amount was needed. However, there could have been need for more. It could have happened here. An explosion did happen in Texas City. Explosions do occur frequently in the mines. In emergencies people volunteer, but it takes time to collect and to process the blood. Sometimes it means the difference between life and death. A serious auto accident recently nearly crushed a college student on a campus not yet served by a blood program. It so happened that she was AB negative type which is found in approximately .6% of the people. Before donors who had the right kind of blood for the 15 transfusions she needed were found, it was necessary to type three thousand students who volunteered to donate blood. It also required approximately 100 hours of work for two persons to type the required number of people. Again a time factor was involved.

It is the purpose of the Red Cross National Blood Program to maintain an adequate supply of blood and its fractions and to make it available to all without cost for the products. Through its research, its blood centers and relationship with other health agencies it hopes to foster humanitarian attitudes and render service where needed.

Comparative Studies of Students in First Term College Biology

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The colleges formerly distinguished between students who had had high school biology and students who had not in terms of the collegiate courses to which the respective groups were assigned. Those who had had a year of high school biology were assigned to the second quarter or semester of the related college elementary course while the others were assigned to the first quarter or semester. Later, and in terms of current general practice, no distinction is being made between the students in these two groups in that all of them are placed in the same beginning courses in biology. The colleges believe in terms of their practices that the high schools as a group, are not effective enough in their preparation of pupils in biology to warrant giving credit for courses in high school biology.

From the high school point of view, it appears desirable to teach the sciences in high school because of the relatively small percentages of high school pupils who go to college. The majority of high school pupils receive the only formal training in the sciences which most of them will ever receive. From the college point of view, if the high school courses have resulted in real training in the sciences, the students should not be required to repeat work which they have already mastered and waste time which they might spend more profitably in more advanced study. For colleges to continue to give no credit for high school achievement in the sciences seems to be an indictment of the quality of the training given in these fields.

Prior studies of the classroom achievements of students in elementary biology courses in college show that there are no differences or at most slight differences in achievement in college biology favoring those who had high school biology. . . .

In his attempt to find that high school biology has or does not have a significant value in biology at the college level, the writer has undertaken this brief study of

the comparative achievements of two groups in college biology. The study measures the differences in performance of a group of students who had high school biology and a group of students who had no formal training in biology before entering college. A further comparison has been made between the performances of the men and women as an indication that the ancient superstition that women have less scientific aptitude than men is or is not true and that the more modern superstition that women are the better students, is or is not correct.

For the purposes of this paper the group which had high school biology will be designated as "Hads" and the group which had no high school biology as "Had Nots." An elementary statistical treatment of the scores of these four groups in each of the five non-standardized objective college classroom tests in biology was used. The basic criterion for judgment was the usual formula for the differences between means from these classroom tests. In addition, the scores from the American Council on Education Psychological Examination for College Freshmen were collected in order that any marked differences in the mean scores of any of the four groups on this examination might be noted. Necessarily there were limitations to the study. The group completing this one quarter course was composed of 165 students who either had or had not had high school biology. Of these, five did not state that they had or had not had high school biology and could not be included in this comparison. The study comparing the men and women included the 165 students. The number of women included in the study was 113. The number of men varied from 58 on the first test to 52 on the fourth and fifth tests, as the scholastically poorest of the men withdrew from the course. The effect of tutoring between the first and second classroom tests influenced the comparison between the "Hads" and the "Had Nots" for the reason that, of the thirty-three students who were tutored, twenty-four were "Had Nots" and nine were "Hads." The tutoring consisted of a two hour session, given by a graduate student, on material to be covered in the second test.

The tests were drawn up by the teacher of the course and were composed of selections from among thousands of similar objective test items in a proportion believed by the instructor to parallel the emphasis given the various subtopics in the text, the lectures, and the laboratory. The test items were predominantly of the matching form. The remainder were of the simple (one word) completion form.

The following tabulation shows the results of the "Hads" and the "Had Nots" in this biology class:

TABLE I

COMPARISONS OF OBJECTIVE TESTS RESULTS BETWEEN THE "HADS" AND THE "HADNOTS"

Test	Group and No. of Students	Possible Points on Test	Mean Points Made	SD	Diff. between M's	PE Diff.	Chances in 100	Group Favored
No. 1	Had 118	50	36.8	7.3	0.4	0.3	64	Had
	Had Not 48		36.4	6.4				
No. 2	Had 117							
	Had Not	125	85.1	11.9	2.8	1.3	92	Had Not
			82.2	12.6				
No. 3	Had 115		51.3	8.3	1.8	1.0	86	Had
	Had Not 48	75	49.5	10.4				
No. 4	Had 113	50	38.3	7.2	0.9	1.0	86	Had
	Had Not 47		37.3	4.2				
No. 5	Had 113	200	166.8	13.7	3.5	1.5	93	Had
	Had Not 47		163.2	14.0				

In the study comparing the differences in the achievement of the "Hads" and the "Had Nots," the "Hads" showed what would appear to be significant superiority on four of these five tests according to a statistical table of chances of a true difference greater than zero, given the actual difference. The "Had Nots" scored higher on the second test.

a limited extent, the more able students enroll in high school science courses. The difference between the mean scores of the men and the women is of very little or no significance.

While the differences between the scores of the "Hads" and the "Had Nots" in terms of the chances in one hundred that these differences are real

TABLE II

ACHIEVEMENT DIFFERENCES ON CLASSROOM BIOLOGY TESTS BETWEEN MEN AND WOMEN

Test	Group and No. of Students	Possible Points on Test	Mean Points Made	SD	Diff. between M's	PE Diff.	Chances in 100	Group Favored
No. 1	Women 113	50	37.3	5.7	2.1	2.2	99	Women
	Men 58		35.1	6.0				
No. 2	Women 113		85.8	15.0	5.4	2.5	99	Women
	Men 57	125	80.4	12.5				
No. 3	Women 113	75	51.6	7.4	1.9	1.1	87	Women
	Men 55		49.7	11.3				
No. 4	Women 113	50	37.5	4.1	0.6	0.5	73	Men
	Men 52		38.1	7.2				
No. 5	Women 113	200	166.0	14.2	0.6	0.3	64	Women
	Men 52		165.4	8.4				

In the second part of the study the differences in scores on these five tests between the men and the women taking these tests showed the women to be the superior group in four of the five tests. The men did better than did the women on the fourth test. The table that follows summarizes the comparative data between these men and women.

Assuming the scores on the American Council on Education Psychological Examination to be in large part measures of ability to do college work, it was found that the "Hads" were the superior group. The mean score on this examination for the "Hads" was 94.3; that for the "Had Nots" was 88.9. The mean score for the men in this group was 94.4; the mean score for the women was 92.2. The difference between the mean scores on this examination between the "Hads" and the "Had Nots" is probably of some significance even though it is small. A reasonable conclusion would be that, to

differences, it is believed that several factors tend to reduce the seeming significance of these differences. First, the numbers of test items in all of the classroom tests except the final examination were small, thus making the influence of chance in their answering larger than it would have been in examinations containing larger number of test items. Second, the number of men in the class was small, increasing the factor of chance in the selection of these men as a representative group. Third, the poorest men in this class scholastically, withdrew from the class during the quarter, in this way narrowing the range of ability and interest in biology within the group of men in this class. Fourth, the scholastic ability of the "Hads" was slightly higher than that of the "Had Nots" as shown on the American Council on Education Psychological Examination. Fifth, it would appear to be a reasonable assumption that the "Hads" had greater

interest in biology than the "Had Nots" by reason of their having chosen to enroll in this course in high school and to enroll in it again in college. Some few of the "Had Nots" might have attended high schools so small that there were no courses in biology offered. Some of the "Hads" might have been required to enroll in biology in high school by reason of the nature of the curriculum offered. As a whole, however, the high schools of Oregon permit enough choices of classes by the pupils to make the numbers of members of this college course in biology so affected very limited, if they were affected at all. This interest in biology as a subject for study would, in all probability, affect the quality of the work done apart from the study of this subject in high school. And of course the number of students in the survey was small.

A review of the literature regarding the carry-over value of high school biology into college achievement is not conclusive. There is a conflict regarding its value and conflicting evidence from various research projects. In the opinion of the writer the carry-over value of high school biology to college is small if it is real. In a study comparing the differences in the achievements between the "Hads" and "Had Nots," the "Hads" showed slight superiority in four of the five classroom tests, from sixty-four to ninety-three chances in 100. As previously noted, the second test gave the "Had Nots" an apparent advantage which was evidently due to tutoring a relatively large number of "Had Nots." On the one hand, very few of the "Had Nots" had any science subjects in high school and, hence, had no acquaintance with science terminology, no training in the special ways of studying biology, no practice in the drawing and labeling of parts, no practice in assembling biological data under various headings, and no definite experience in keeping systematic notes. These are fundamental in the study of the sciences and should be definite values in the carry-over. This prior training, and the fact that recall or relearning of material once learned is easier than the initial learning plus some knowledge of how to study biology are the factors favoring the higher college achievement of the "Hads." On the other hand, alert and interested students can gain the relatively small amounts of these skills required in an elementary course in college biology rapidly during such a course. The quality of the instruction in the high school class would, without much doubt, be a noteworthy factor—if it could be measured—in any carry-over to college courses in biology which there might be.

The literature shows that women are superior to the men in linguistic or glossary work. The results of comparing the college classroom biology achievements of the men and women in the five tests showed a superiority of the women in four of the five tests but that, as the course progressed, the chances in favor of the women decreased. Since this course in general biology and the examinations thereon emphasize the acquiring of a considerable amount of terminology, this slight superiority of the women is in keeping with the greater linguistic interest and achievement of women as a group and their generally greater industry as students.

It is the conclusion of this writer that the influence of high school training in biology has, in general, little carry-over value in college courses in biology and that any superiority which men students may have in the study of the sciences is exceeded by the greater industry and verbal interests of the women students. To a limited extent, the more able high school pupils enroll in high school science courses, among which are the courses in biology. To a probably greater extent,

the pupils more interested in biology enroll in biology courses in high school and, later, in college. It would appear, therefore, that the general practice of colleges and universities of placing all beginning students in biology, regardless of their having had or not having had high school biology courses, is justified.

Ants in Palaces, Export Industry Run by a Woman

Mrs. May Briant, 63, of Bedford, England, is sending "ant palaces" to United States and other overseas markets. Forty-five years ago, her husband, Robert, a lecturing entomologist, after years of research, produced a soil in which the Amber Meadow ant will work. When he died in 1919 she began to sell "ant palaces" in order to educate her children. She did not go in for export until a friend explored and explained the American market.

Into a wooden frame Mrs. Briant fits two sheets of 8″ x 8″ glass, ⅛th of an inch apart; and into this space she puts one queen ant and about 200 workers with some of the processed soil. Here they live through the whole cycle of their hard working and autocratic regime. The queen ant is waited upon by her train of personal attendants; her eggs change to larvae, cocoons, and finally hatch into ants which, in turn, begin their ceaseless work until they finally die.

The pictures show: *Top Left:* Enlargement of main chamber of one of Mrs. Briant's ant palaces. The queen (the large ant) is surrounded by her attendants and minor workers, who look after her and carry off her eggs and larvae. Major workers, who do the rough work, building, and guarding entrances, are the darker ants outside the main circle.

Top Right: Mrs. Briant with a tray of freshly dug earth containing ants.

Bottom Left: The two glass sheets containing the processed soil.

Bottom Right: Eric Briant, son of Mrs. Briant, searches for a queen in an ant colony he has dug from the earth. Photos by British Information Services.

Submitted by
JEANNE M. LAZARUS,
British Information Services,
New York 20, New York

BIOLOGY LABORATORIES

By The "Old Fossil"

MORTON ARBORETUM. Lisle, Illinois has some interesting sheets on botany and related subjects. They are in two and three colors. They have been distributed to many teachers in the Chicago area. Write if interested; perhaps you may secure copies. There are several dozen kinds. They are informative prepared-by-the-instructor-for-the-student type of material.

RAFFIA. A good project for your science club is to improve the appearance of the biology class room and laboratory. Woven raffia tinted with colors makes excellent supports for hanging potted plants and vines. Use them in place of the ordinary chains which are purchased for the purpose.

HEALTH FILMS, ILLINOIS, 16 mm sound, State Department of Public Health, Springfield, Illinois. *Report To The People,* about the department of Public Health; *Something You Did Not Eat,* good; *Your Child's Ears'* animated physiology; *Time Is Life,* early diagnosis of cancer; *Water Supply; Traitor From Within,* biological facts about cancer tissue; *This Is Tuberculosis; Time Out,* T. B. inception of disease to cure. Write to your own state department of Public Health; they perhaps have similar or the same films.

BLACK SQUIRREL. Driving on Sheridan Road in Winnetka the other afternoon thru a residential section belonging to VIP I saw a black squirrel. It was tame. I walked to within eight feet of it. I asked five of my biology friends before I found any information on them. There is a colony of black squirrel in Battle Creek, Michigan.

There is a colony of albino squirrels in Olney, Illinois. The citizens are quite proud of them. They have shipped pairs of them to other parts of the country but to date none have established themselves. They are the albinistic phase of the common gray squirrel. This conclusion was reached because they will interbreed with the common gray but not with the fox.

THE NATURAL HISTORY MAGAZINE for November 1949 has an article on these two phases of the squirrel. Published by AMERICAN MUSEUM OF NATURAL HISTORY, Seventy-ninth Street at Central Park West, New York 24. Edited by Edward W. Weyer, Jr.

FOOD VALUE CHARTS. Mr. Ludlow, whe retires at the end of this year, has some very interesting charts in his General Science room. They are published by the NATIONAL LIVE STOCK AND MEAT BOARD, 407 S. Dear-

born Street, Chicago 5. This is the fifth edition.

Aquaria. Certainly no biology classroom or laboratory is complete without an aquarium or terrarium of local fauna and flora. If there is to be only one by all means get a few of the native aquatic plants, amphibia, reptiles, fish, mammals and insects. Discuss the problem on a Thursday and ask who would get certain specimens over the week end. Write down their names and what they propose to collect. Mention it again on Friday. Week ends in the country help in these matters. Such trips serve as excellent conversation pieces for the student and class for the following week.

Terraria. The container for your terrarium may be a salvaged aquarium tank. Occasionally you will have an aquarium which is persistent about leaking. There are several themes to be worked out. Fern types are interesting. Local mosses are good. Insect eating plants make another type. The bog terrarium or the woodland terrarium offers variety in the type of planimals to be included.

Biology in action. This booklet published by illinois institute of technology, Technology Center, Chicago 16, is interesting. The contents include recent developments in biology as exemplified in fields of genetics, bacteriology (antibiotics), physiology and biochemistry. The letter of transmittal from Dr. Leslie R. Hedrick states:"This pamphlet presents the philosophy of our department and especially emphasizes the relation of biology to chemistry, physics and mathmetics in the light of recent experimental research." Free to teachers and advanced science students.

Plant preservation. The preservative used for plants is often afa. It consists of alcohol and formaldehyde both long known as preservatives for animals. The other is acetic acid. You know the value of vinegar for pickles. The three combined do not shrink nor distort plant tissues. afa—Alcohol, Formalin, Acetic Acid.

In the meantime it is the Old Fossil at 5061 N. St. Louis Avenue, Chicago 25.

PROGRESS IN HAWK AND OWL PROTECTION

Only six states still fail to protect any of the birds of prey, according to the first 48-state survey of its kind, published in the November-December issue of *Audubon Magazine,* organ of the National Audubon Society. Fifty years ago, when the first issue of *Bird Lore* (predecessor of *Audubon Magazine*) appeared, just five states offered any legal protection to the eagles, hawks and owls. The article asserts that despite this apparent progress, actual protection lags far behind legal protection. It is pointed out that few state conservation departments make any realistic effort to enforce the laws protecting birds of prey regardless of the fact they are charged with that responsibility.

The six states where birds of prey apparently have few friends are Alabama, Arkansas, Georgia, Idaho, New Mexico, and Virginia. However other states—particularly Maine, Maryland, Michigan, Nevada, New Hampshire and Oklahoma—are also cited as having weak laws, and some states that have enacted "progressive" legislation are considered to be centers of prejudice against predatory birds. Many of the protective laws now in forces are based on scientific research into the food habits of hawks and owls which, according to the article, reveals the value of these birds in controlling insects and rodents that exact a yearly tribute of millions of dollars worth of farm crops.

The article states, "There is no such thing as a 'good' or 'bad' species of hawk or owl; each has a role to perform in nature's economy; no species of hawk or owl is in itself 'destructive' in its ecological function."

The survey concludes that the future existence of several species of predatory birds is threatened and urges the enactment of "model laws" in all states and a program of education and law enforcement to prevent further depletion of these birds. A copy of the full survey will be mailed upon request to *Audubon Magazine,* 1000 Fifth Avenue, New York 28, N. Y.

Wilderness Travel by Trail*

SHIRLEY W. ALLEN
University of Michigan, Ann Arbor, Michigan

Horseback trips and to a less extent canoeing opportunities have been available at reasonable cost almost every year since 1933 to the members of the American Forestry Association, which serves as a rallying place for the friends of forestry whether they be trained foresters or plain garden-variety of public-spirited folks. It is the latter group which forms the bulk of the membership and many of them had their introduction to the program through signing up as "Trail Riders of the Wilderness." Once exposed they are likely to try it another time, and to keep up their membership in the Association.

In all of the early forays into wilderness, from the days of Jim Bridger, and the exploring expeditions in the Yellowstone to the one-night-out trip from today's most expensive resort, certain features are common. Primitive modes of transportation; penetration of wild and infrequently visited country; camping and cooking with limited equipment and the sort of foods that can be easily carried or that can be captured daily; sleeping under the stars; gathering in close and friendly companionship at the campfire with the singing, the tall stories, the banter and those long moments of dreamy silence; the flood of questions on the trail and in the camp; the grist of minor adventures with horses, storms, "yellow-jackets", mountain climbing and fishing; the amateur but deadly serious nature study; the photographer (in the role of pest or friend); the distinctive dress; the understanding which develops between horse and rider; the color and culture of the local people who go along as guides, cooks and wranglers;—all these in the mountain trips make up the daily program, and the record in thousands of diaries, hearts and photographic collections. Added to these, from the canoe country, may be the many ways of getting wet, the portage, the fast-water incidents, and a bit more under heading of "the big fish." I can think of no finer way for a biology teacher to spend 10 or 12 days.

The first trip left from Helena, Montana, for the South Fork Wilderness (now a part of the Bob Marshall Wilderness) on July 11, 1933, with twenty-two riders, from ten different states and the District of Columbia. There were two guides, two cooks, a boss packer and four wranglers. Fifty-five horses and mules were required. The first day's ride was eighteen miles and the party spent six days in the wilderness. They called themselves the "Pioneers". All returned safe and enthusiastic and as their telegram at the end recites: the venture "was a complete success and through country we never dreamed existed."

Since that year the American Forestry Association has arranged and carried out with marked success almost 100 expeditions, exploring 19 wilderness areas in nine states and making available to 1100 riders the resource, whatever it is, of the wilderness. More than two hundred of these riders have been "repeaters," and a score or more have been on five to twelve of the trips. The average party included from twenty to thirty.

Available to this peculiar sort of wilderness travel are no less than 77 es-

* Presented before the sectional meetings of the National Association of Biology Teachers and Detroit Biology Club at Cranbrook Institute, Michigan, November 19, 1949.

tablished or proposed wilderness and wild areas. A few of these are recaptured lands upon which lumbering or mining and prospecting has been relatively active in the past. Certainly enough of them to impress the most doubtful, exhibit natural conditions which would compare with those at the time of the Louisiana Purchase.

Because practically all of the areas except the canoe country in Minnesota are high, the time available when travel is safe extends only from late June to early September. At that, the elements are not always kind. Rainstorms while on the trail are uncommon but certainly not unknown. Trail riders do not claim to enjoy such weather but it is a part of the whole adventure and they are usually well equipped with slickers or ponchos which keep them reasonably dry. Always there is a blazing campfire in the evening and reasonable assurance of a warm, dry, night's rest.

Reminiscing trail riders would indicate that many of the lasting memories of these expeditions, center around the campfire conversations, friendly arguments and questionings. At any one of these gatherings, there may have been serious discussion along with the inevitable singing, the fiddle, guitar, moutharp, accordion, banjo accompaniment, and the special stunts arranged by the guides and other helpers, and by the riders themselves. At any one campfire, the leadership may come from the head guide, one of the wrangler-musicians, or from a natural born master-of-ceremonies among the college students, business people or teachers who may be along. Sometimes the leader, representing the American Forestry Association, takes over. More often the evening's doings are spontaneous with no lack of talent or things to discuss.

Today, these natural resources of solitude and life and beauty and freedom and grandeur,—all integrated into the one natural resource we call "the wilderness," are no easy things to conserve and defend, and they may not always be available to teachers. The wilderness with its characteristic vastness, combined with cover which could be translated into profit, may sometimes be questioned sharply from the viewpoint of equitable distribution when it is realized that relatively few can ever make use of such sources of strength and inspiration.

Wildernesses we must have if only to dream about and cherish as saved specimens of the America we love. And many groups whose chance to see one of the great dedicated areas, is remote, work constantly for the idea. A "Wilderness Society" insists that wilderness is a necessary natural resource, that mechanized civilization in terms of sights and sounds must not be permitted to clash with the values of primeval environment, and that wildernesses belong to the whole people and must be defended. The Sierra Club, the Appalachian Mountain Club, and similar organizations have long cooperated with public agencies in keeping great areas inviolate. Recently a study was conducted by a committee appointed by the National Research Council to consider the possible threat to solitude and to other values from airplane travel in and over wilderness areas. As time goes on the need for wilderness values will increase. Almost no area can now be recaptured and restored. Always the priceless opportunity for renewal and inspiration will justify the same effort at conservation that is more readily appreciated in thinking of material values.

Book Reviews

MONIER-WILLIAMS, G. W. *Trace Elements in Food.* John Wiley and Sons, Inc., New York 16, New York. 511 pp. Not Illustrated. 1949. $6.00.

Thirty-nine trace elements, which may be present in the human body and in most foods in amounts up to 0.005 per cent, are discussed in careful detail in this authoritative British-authored book. The effects of different quantities of each trace element on animal protoplasm, and detailed yet generalized analytical methods for determining the comparative amount of each element in a food, are outlined. The author suggests possible ways by which each trace element may gain access to foods during their manufacture, or during the life processes of the plants and animals from which organic foods are obtained. The discussions involve also the biochemistry, nutritional significance, and toxicology of trace elements.

The book is carefully written and well organized. The text matter should prove valuable to teachers of biology, chemistry, and home economics at the college level. High school teachers may find it useful as a reference work for special projects. A complete bibliography is included at the close of each chapter. The index is comprehensive and conveniently usable.

B. BERNARR VANCE,
Chairman, Science Department,
Kiser High School,
Dayton 4, Ohio

CARTER, VERNON GILL. *Man on the Landscape.* The National Wildlife Federation. 129 pp. illus.

This book presents "The fundamentals of plant conservation" written by the supervisor of Conservation Education in the public schools of Zanesville, Ohio. It is a valuable reference book and should have a place in every laboratory and classroom where biological and physiographical sciences are taught in secondary schools and colleges.

The author deplores very convincedly the indifference of many people to the value of plant life to the soil and the economical and social implications. His style is easy and his illustrations are well chosen.

It is true that men have made many normal landscapes abnormal. Mr. Carter impresses this mistake on the reader and suggests how remedies may be applied. He explains that the balanced cycles of minerals, air, water and organic matter have been disrupted, but not hopelessly so.

The suggestions for classroom activities are good. The general education implications are well presented.

The appendices are interesting and timely. The reader becomes very well aware of the part vegetation has and will play for good or evil in his life.

GUY F. WILLIAMS
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Colby Junior College,
New London, New Hampshire

MOOG, FLORENCE. *Structure and Development of the Vertebrates.* Prentice-Hall, Inc., New York. xi plus 170 pp. Illus. 1949. $3.50.

This book is designed to serve as a laboratory guide for a course in which the usual subject matters of comparative vertebrate anatomy and vertebrate embryology are integrated into a single course. To perform all the exercises included would take about 180 hours, but would lend itself to a course with 100 to 120 clock hours.

There is one-half page of terminology. The first chapter is devoted to the anatomy of the Ammocoetes. Chapters two and three deal with the early embryology of the frog and chick. Chapter four is a survey of the Phylum Chordata. The remainder of the book deals with the development and comparative anatomy of each of the body systems. Directions for dissection and study are clearly given.

The book is well illustrated by diagrams and photographs. There is a good index. It has an attractive cloth-bound cover. Good quality paper is used and the size of the pages is 11 × 8 inches. Anyone contemplating a combined course in vertebrate embryology and comparative anatomy should examine this book.

M. A. RUSSELL
Junior College,
Highland Park, Michigan

CALVIN, MELVIN, HEIDELBERGER, CHARLES, REID, JAMES C., TOLBERT, BERT M. and YANKWICH, PETER F. *Isotopic Carbon-* Techniques in its Measurement and Chemical Manipulation. John Wiley and Sons, New York. xiii + 376 pp. illus. 1949. $5.50.

The use of radioactive tracers has become standard procedure in biology and medicine. The carbon isotopes, C^{11}, C^{13}, and C^{14}, are the basis of this excellent text. The properties of the isotopes, their preparations and decay schemes are presented very clearly. For those not familiar with radioactivity measurements there is a brief discussion of various instruments and detectors of radiation. These are chosen with particular applicability to the carbon isotopes.

Most of the text is devoted to the preparation of samples and synthesis of organic compounds containing the radioactive carbons. Many of the procedures described are unique, some from unpublished notes of various workers. Criteria of purity, degradation procedures and biosynthetic methods are summarized.

Appendices I–IX contain much useful information on dilution methods, statistical treatment of data, coincidence corrections, counter efficiency and radioactivity assay operations.

A very complete bibliography, carefully arranged according to general topics, is included. This volume is one of those handy reference texts which every biophysicist and biologist interested in radioactive tracers should have.

KARLEM RIESS
Tulane University
New Orleans, Louisiana

OTTO, JAMES H., and BLANC, SAM S. *Biology Investigations.* Henry Holt and Company, New York. iii + 245 pp. illus. 1949. $1.28.

Biology Investigations is a laboratory manual intended for the course in high school biology. Realizing that many high school laboratories are inadequately equipped, the authors have reduced as much as possible the amount of apparatus necessary to conduct the experiments and have prepared alternative suggestions for use when equipment is not available. The investigations are broken down into several parts so that portions may be omitted when time runs short. The manual is divided generally into a long section, *Basic Investigations,* and a shorter one entitled *Special Laboratory Investigations.* The latter will be especially helpful for the more ambitious student as many of the studies can be carried out at home as well as in the laboratory. A paragraph, *What Does This Mean to You?,* is included in each investigation and will help the teacher answer the inevitable questions, "Why should I take this?" and "What good will this do me?" Another section, *Other Things You Can Do,* and the appendix, which contains a list of long range projects for pupils with special interest in biology, will provide incentive for additional study.

MARY L. HIXSON
Oklahoma Baptist University
Shawnee, Oklahoma

CHU, H. F. *How to Know The Immature Insects.* Wm. C. Brown Company, Publishers, Debuque, Iowa. 234 pp. 631 illus. 1949. spir. $2.00, cloth $3.00.

How To Know Immature Insects is a laboratory manual that is essentially a pictured key for the identification of immature insects to their orders and families. An interesting discussion as to their importance includes life span, feeding habits, evolution and adaptation, and control. Both clarity and conciseness has the morphological description of the types of eggs, nymphs, naids, larvae, and pupae. An awareness of the need for information about immature insects is touched upon by the author in his introduction. Brief information is also given on the rearing, preserving, collecting apparatus and localities, and more detailed information is given on the methods of how to collect insects. Emphasis is placed upon the understanding of terms concerning the different stages of the immature insects and if the reader does not have a basic entomological vocabulary, much clarification is given by a pictured glossary that is combined with a complete and accurate index. The organization of the dichotomous key is well done, with significant distinguishing characteristics used. Perhaps more association of the common names of insects with

the scientific names would aid in a greater retention of the material.

The manual has excellent morphological illustrations with some labelling and many enlarged detailed drawings of characteristic structures. The illustrations are numerous and well correlated with the contents of the book thus leaving little room for misunderstanding the written material; charts and diagrams are a further aid to this end. Following the key, a selling feature for advanced study, are six pages of some of the important references classified according to authorities of the different insect orders. This manual is another contribution to the Pictured-Key Nature Series, which may be obtained either in the spiral or cloth binding, and the compact size facilitates ease of use in the field.

It may well be recommended for constant use in the field and laboratory as well as for class reference. The material is designed to make it as easy as possible for the student to acquire a ready knowledge of immature insects.

RUTH E. GRIFFITH,
The State College of Washington,
Pullman, Washington

WRIGHT, ALBERT HAZEN and WRIGHT, ANNA ALLEN. *Handbook of Frogs and Toads.* 3rd. ed. Comstock Publishing Co., Inc., Ithaca, New York. xii + 640 pp. illus. 1949. $6.50.

This third edition of one of the best known of the handbooks has been enlarged, extended and improved, but retains the general features of its predecessors. The arrangement is that found most useful for books of this sort, first a general account including a treatment of taxonomic principles, then the keys and the accounts of the individual species. There is a plate and distribution map for almost every one of the hundred species and subspecies included. The general account section is an excellent treatment of frogs and toads—not just descriptive, but ecological and dynamic. The keys have been made more explicit and many points are illustrated. The plates, mostly photographs from life, are accompanied by field notes which seem to emphasize the living animal in its environment. The biblography is organized into separate parts, I. General Works, II. General Check Lists, III. State and Province Lists. The latter covers all of the United States and most of Canada and Lower California. The extensive index is well organized, with bold face numbers to refer to the species acount pages. The style is such that any interested person can read it. One does not have to be a taxonomist to understand the book although even the expert will find plenty of good firm meat in it. It is a must for all professional and amateur herpetologists and a good reference for all who are interested in general zoology.

HUETTNER, ALFRED F. *Fundamentals of Comparative Embryology of the Vertebrates.* rev. ed.—Macmillan Company, New York. xviii + 309 pp. illus. 1949. $5.00.

The new edition of this book retains all of the essential features of the first. It should by all means do so, for the first received highly favorable recognition. The addition of the chapter on the 7 mm. pig, with its clear and carefully labelled pictures, is a marked improvement. The sequence of topics is about the same as in the first edition: History and Theories of Development (this chapter leaves too much unsaid, in the opinion of the reviewer), Protoplasm and the Cell, Chromosomes, Gametes, Fertilization, Amphioxus, three chapters on the frog, seven chapters on the chick, five chapters on the mammal.

The arrangement of the book, text, pictures subheadings and legends is excellent. It is easy to find something you are looking for. The style makes for easy reading, although there is no oversimplification. The approach is almost, but not quite, completely morphological. This is not to discount the importance of the experimental, but to give the student a picture of the embryological stages themselves before getting him into the deep water of the experimental modifications. There is no glossary. The index is complete and well organized. The book is a fine text for college students and an equally good reference for high school teachers and advanced high school students interested in the field. It should be available in every laboratory where vertebrate embryology is studied.

JOHN BREUKELMAN

THE STAFF

In order that readers may know who carries the chief responsibilities in the activities of THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS and *The American Biology Teacher* it is the policy of the journal to publish twice a year, in the November and February issues, a complete list of all staff members. Lists of chairmen and personnel of committees are published in connection with reports of their activities.

All these individuals are deeply interested in the improvement of both the association and the journal. They welcome suggestions from members and are ready to give assistance to anyone interested in writing items or other articles for the journal.

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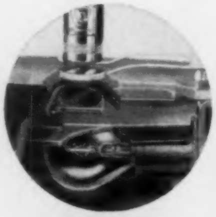

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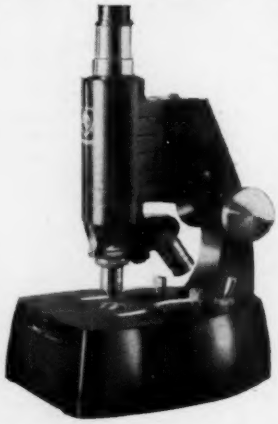

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